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TREES OF THE CARIBBEAN NATIONAL FOREST, PUERTO RICO

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RESUMEN

El Bosque Nacional del Caribe en las Montañas de Luquillo en el noreste de Puerto Rico es único en el Sistema de Bosques Nacionales. Su vegetación tropical varía desde el frondoso bosque pluvial en los montes bajos hasta el bosque enano en los picos más altos. Dentro de sus linderos consistentes de 28,000 acres hay 225 especies de árboles nativos, más que en cualquiera otra área igual en los Estados Unidos. Entre estas especies, 88 están clasificadas como endémicas o raras. Sesenta y ocho especies de éstas están limitadas a Puerto Rico y 23 son silvestres y se encuentran solamente dentro de los límites del bosque.

SUMMARY

The Caribbean National Forest in the Luquillo Mountains of northeastern Puerto Rico is unique within the National Forest System. Its tropical vegetation varies from luxuriant rain forests on the lower slopes to dwarf forests on the exposed peaks. Within its boundaries of 28,000 acres are 225 species of native trees, more than in any other equal area of the United States. Among these species, 88 are classed as endemic or rare. Sixty-eight are limited to Puerto Rico and 23 of them found wild only within the forest boundaries.

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TREES OF THE CARIBBEAN NATIONAL FOREST, PUERTO RICO¹

By Elbert L. Little, Jr.² and Roy O. Woodbury³

The Caribbean National Forest in the Luquillo Mountains of northeastern Puerto Rico is unique within the National Forest System. Its tropical vegetation varies from luxuriant rain forests on the lower slopes to dwarf forests on the exposed peaks. Within its boundaries of 28,000 acres are 225 species of native trees, more than in any other equal area of the United States. Among these species, 88 are classed as endemic or rare. Sixty-eight are limited to Puerto Rico and 23 of them found wild only within the forest boundaries.

BOTANICAL EXPLORATION

The Luquillo Mountains have attracted the attention of botanists and botanical collectors through the years. This area was accessible earlier than the larger mountainous regions of the central and western parts of the island.

The early history of botanical exploration has been reviewed by Otero, Toro, and Pagán (1945). One of the first large plant collections in the Luquillo Mountains was made by the German, Paul Ernst Emil Sintenis (1847-1907). He obtained numerous specimens and duplicates on three collecting trips from 1884 to 1887. Many of his sheets, including duplicate types of new species, are in the National Herbarium (US) of the U.S. National Museum of Natural History, Washington, D.C. Sintenis, according to the reference cited above, was the first to collect at El Yunque, the prominent northern peak of the Luquillo Mountains.

Botanical exploration increased after Puerto Rico became a part of the United States in 1898. Cook and Collins (1903) prepared a detailed compilation of the economic plants. The first forestry report was by Hill (1899).

In 1903 the Caribbean National Forest, originally Luquillo Forest Reserve and later also Luquillo Experimental Forest, was established from former Spanish crown lands by proclamation of President Theodore Roosevelt. Soon afterwards, Gifford (1905) published a description of this forest and a preliminary list of the trees. Murphy (1916) of the U.S. Forest Service prepared a list of 292 tree species of the island.

Nathaniel L. Britton, co-author of the descriptive flora of Puerto Rico and the Virgin Islands (Britton and Wilson 1923-30), visited the Luquillo Mountains many times during his almost annual trips to the island from 1914 to 1932. Field work then was on foot and horseback. The

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Civilian Conservation Corps program of the U.S. Forest Service during the 1930's made the region more accessible by completing the highway through the mountains and constructing a network of trails. Forest Supervisor E.M. Bruner, W. P. Kramer and W. R. Barbour aided Britton. The type specimen of *Ardisia luquillensis* (Britton) Alain was collected along the Catalina-Yunque Trail by Britton and Bruner in 1923.

Later botanical field work in the Luquillo Mountains was summarized by Little, Woodbury, and Wadsworth 1974, p. 4-7. The Herbarium of the Institute of Tropical Forestry (RPPR) was started in 1932, though a few specimens date back to 1929. Several are by Britton alone or with foresters in 1931-32. C. L. Horn and G. A. Gerhart were early collectors. After forestry research was formalized in 1939, L. R. Holdridge, L. E. Gregory, and J. Marrero made large collections over the island. From Holdridge's specimens in the Luquillo Mountains, these tree species were named as new: *Myrica holdridgeana* Lundell (1942), *Calyptranthes luquillensis* Alain (1963), and *Eugenia haematocarpa* Alain (1963).

The authors made additional studies of the trees of Luquillo Mountains for their 2-volume reference. Wadsworth (1950) has conducted forestry investigations in Puerto Rico and particularly within the Caribbean National Forest since 1942. Little made various collecting trips beginning in 1950 and named *Byrsonima wadsworthii* Little (1953). From 1956 on, Woodbury has made large collections. Longwood (1961) described the important native woods.

Alain H. Liogier (1963, 1965a, 1965b, 1967) has published new records and new species including the two cited above and has revised the nomenclature of the flora.

From 1963 to 1968, the United States Atomic Energy Commission conducted a special study at El Verde, a plot of lower montane rain forest in the Caribbean National Forest and published a comprehensive reference (Odum and Pigeon 1970). Chapters on tree identification were contributed by Little (1970, Ch. B-2), Duke (1970, Ch. B-15), and Smith (1970, Ch. B-16).

Howard (1968) and associates made extensive studies of the dwarf forest at Pico del Oeste (West Peak) within Caribbean National Forest. Weaver (1972) described the same type at Pico del Este (East Peak). Earlier, Howard (1957, 1966) monographed the genus *Coccoloba*, one of the largest tree genera on the island, and made additional discoveries.

The Luquillo Mountains have been included in general studies of the vegetation of Puerto Rico by Gleason and Cook (1927), Cook and Gleason (1928), and Dansereau and Buell (1966). Ewel and Whitmore later (1973) prepared a map of the life zones.

STATISTICAL SUMMARY

As summarized here, the native trees of the Caribbean National Forest and Luquillo Mountains total 225 species in 144 genera and 59 plant families. Thus, about two-fifths of the total of 547 native species known from Puerto Rico and the Virgin Islands are represented.

Also listed are 47 introduced species in 37 additional genera and 7 additional families. These are mostly planted, such as in experimental forestry plots and along roadsides. Very few species have escaped from cultivation or have become established as naturalized.

The 10 largest plant families with numbers of native tree species are listed below. Together, they contain 108 species, nearly one-half the total number. Additional introduced species are in parenthesis.

Malastomataceae	22
Myrtaceae	17(3)
Rubiaceae	14(2)
Lauraceae	13(1)
Leguminosae	7(7)
Euphorbiaceae	9(1)
Solanaceae	9
Verbenaceae	7(1)
Cyatheaceae	7
Meliaceae	4(3)

Table 1. Summary of native and introduced tree species of Caribbean National Forest

	Families	Genera	Species
Native			
Ferns	1	3	7
Gymnosperms	1	1	1
Monocotyledons	1	4	4
Dicotyledons	56	135	213
Totals	59	143	225
Introduced (*, I)	7	39	47

The 10 largest genera with numbers of native tree species are: *Miconia*, 12; *Eugenia* 6 (also 1 introduced); *Cyathea* and *Ocotea*, 5 each; and *Casearia*, *Coccoloba*, *Myrcia*, *Solanum*, and *Ternstroemia*, 4 each. Also, *Citrus* has 4 introduced species.

GEOGRAPHIC DISTRIBUTION

The geographic relationships of the trees of the Caribbean National Forest and Luquillo Mountains have been the subject of an earlier study (Little 1970). No revision is needed, except for slight additions in numbers of species and minor range extensions.

Ranges of the species of any area tend to follow certain geographic patterns. However, an analysis of the relationships of the trees of this small mountainous area has limitations. It would not be applicable to the entire island flora, because some forest types and tree species are absent. Also, the number of tree species in an oceanic island such as Puerto Rico probably is smaller than that in comparable areas of continents.

Table 2, slightly revised from the article cited, summarizes the ranges of the native tree species of the Caribbean National Forest and Luquillo Mountains. The 225 species can be placed in 3 main groups, each divided into 3, which are numbered. In the Annotated List the numbers in parenthesis refer to these groups.

Thus, more than two-fifths (41%) of the native tree species of the Caribbean National Forest are native also on the continent. Most of these are widely distributed. Almost three-tenths (28%) are in Greater Antilles or Lesser Antilles or both but not the continent.

The remaining three-tenths (31%), 70 species designated by E in the list, are endemic to Puerto Rico (2 species also in Virgin Islands). Two-tenths (20%) or 45 species are endemic to Puerto Rico but not confined to Luquillo Mountains. One-tenth (10%) or 23 species are endemic to Luquillo Mountains (rarely slightly beyond). These endemic species are discussed separately.

According to the earlier compilation, the approximate numbers of tree species of the Luquillo Mountains native also in the following areas are: Hispaniola, 122 species; Cuba, 105; South America, 76; Venezuela, 65; Central America, 59; Mexico, 44; Florida, 7; and Old World, 4. Thus, more than one-half are native also in Hispaniola, one-third in South America, and one-fourth in Central America.

Table 2. Summary by ranges of native tree species of the Caribbean National Forest and Luquillo Mountains

Also on continent, 91 species, 41%
(1) Puerto Rico to both South America and Central America or also Mexico or Florida), 63 species, 28%
(2) Puerto Rico to South America (including Panama) only, 21 species, 10%
(3) Puerto Rico to Central America (or Mexico or Florida) only, 7 species, 3%
West Indies but not continent, 64 species, 28%
(4) Greater and Lesser Antilles only, 31 species, 14%
(5) Greater Antilles only, 25 species, 11%
(6) Puerto Rico and Lesser Antilles only, 8 species, 3%
Endemic to Puerto Rico (or also Virgin Islands) (E), 70 species, 31%
(7) Puerto Rico and Virgin Islands only, 2 species, 1%
(8) Puerto Rico only (but not confined to Luquillo Mountains), 45 species, 20%
(9) Luquillo Mountains only, 23 species, 10%

ENDEMIC AND RARE TREES

Certainly, the largest number of rare tree species anywhere in the National Forest System is found within the Caribbean National Forest in northeastern Puerto Rico. However, these tropical trees outside continental United States were not included in the first preliminary list of the Smithsonian Institution (1975).

Hawaii has no National Forests and is omitted here. The Fiftieth State has more rare, endemic, and mostly endangered tree species than any other, about 225. These are mainly local and scattered over several islands.

The Caribbean National Forest (known also as the Luquillo Experimental Forest) contains most of the Luquillo Mountains, including the highest peaks, and totals 28,000 acres. Within are two special preserves, the Baño de Oro Research Natural Area of 2,100 acres, and the proposed Cacique Wild Study Area of approximately 8,000 acres. This National Forest originated in a forest preserve formerly under the Spanish crown. This area is the largest remnant of natural vegetation on the island.

The endemic, rare, and endangered trees of Puerto Rico and the Virgin Islands will be the subject of another report in this series and have been described in the 2-volume illustrated reference on the trees of these islands (Little and Wadsworth 1964; Little, Woodbury, and Wadsworth 1974, p. 15-19, iv-xiv). A list of the tree species of the Luquillo Experimental Forest endemic to Puerto Rico has been published (Little 1970b), and a separate publication on the native trees is in preparation.

Within the Caribbean National Forest are found 225 or more of about 547 species of trees native to Puerto Rico and the Virgin Islands, or nearly two-fifths of the total number. Of the 141 tree species endemic or confined to these islands, 68, or nearly one-half, grow wild within this National Forest. In addition to the endemics, about 79 other tree species native beyond Puerto Rico and the Virgin Islands are classed as rare within these islands. Of these 79, this National Forest contains 20.

Thus, 88, more than two-fifths, of the 225 tree species native within the Caribbean National Forest are classed as endemic or rare. None of the 88 grows wild within continental United States. Most are not closely related to the temperate species listed for the other National Forests. Some belong to unfamiliar plant families characteristic of the tropics.

The 88 species of endemic and rare trees of the Caribbean National Forest may be grouped into three lists, as follows:

1. Trees endemic to Caribbean National Forest and Luquillo Mountains, 23 species (including 7 also in nearby Carite Commonwealth Forest).
2. Other trees of Caribbean National Forest endemic to Puerto Rico, 45 species (including 2 also in Vieques and 1 of these in St. Croix).

3. Trees of Caribbean National Forest Classed as Rare in Puerto Rico but Native also Beyond, 20 species.

The extent of this valuable living collection of endemic and rare trees is best known by publication of the lists, as under the other National Forests. In the three lists the species with scientific and common names are numbered in botanical order as in the 2-volume reference cited above. Numbers 1-250 are in the first volume and 251-750 in the second. Several endemic or local species are designated as not rare, being common locally. A few have slightly broader range, as mentioned. Brief notes on rarity have been added.

1. Trees Endemic to Caribbean National Forest and Luquillo Mountains

The list of 23 species includes 7 which range also slightly beyond into nearby Carite Commonwealth Forest. Most of the 16 confined to the Luquillo Mountains have their entire natural range within the Caribbean National Forest. Thus, the Forest Service has sole responsibility for management and protection, so that these species will not become endangered or extinct.

- 35. *Magnolia splendens* Urban, laurel sabino (not rare)
- 120. *Croton poecilanthus* Urban, sabinón (not rare)
- 160. *Laplacea portoricensis* (Krug & Urban) Dyer, maricao verde
- 212. *Micropholis garciniifolia* Pierre, caimitillo verde (not rare; also Carite)
- 237. *Tabebuia rigida* Urban, roble de sierra (not rare)
- 239. *Antirhea obtusifolia* Urban, quina (not rare; also Carite)
- 284. *Myrica holdridgeana* Lundell, palo de cera (also Guilarte and Monte del Estado)
- 401. *Ravenia urbanii* Engler, tortugo prieto (also Carite)
- 465. *Ilex sintenisii* (Urban) Britton (not rare) (also Sierra de Naguabo)
- 512. *Ternstroemia heptasepala* Krug & Urban
- 513. *Ternstroemia luquillensis* Krug & Urban
- 536. *Xylosma schwaneckeanum* (Krug & Urban) Urban (also Carite)
- 553. *Calyptanthes luquillensis* Alain
- 564. *Eugenia borinquensis* Britton, guayabota de sierra (not rare; also Carite)
- 570. *Eugenia haematocarpa* Alain, uvillo
- 589. *Marlierea sintenisii* Kiaersk., beruquillo
- 600. *Miconia foveolata* Cogn., camasey
- 621. *Tetrazygia urbanii* Cogn., camasey (also in Carite)
- 632. *Ardisia luquillensis* (Britton) Alain, mameyuelo (also in Carite)
- 633. *Grammadenia sintenisii* (Urban) Mez
- 650. *Styrax portoricensis* Krug & Urban, palo de jazmín (also Carite)
- 689. *Brunfelsia lactea* Krug & Urban, vega blanca (also Carite and Monte Torito near Cayey)
- 690. *Brunfelsia portoricensis* Krug & Urban

2. Other Trees of Caribbean National Forest Endemic to Puerto Rico

This list contains 45 species endemic to Puerto Rico but not confined to the Caribbean National Forest. Many of these grow wild also in one or more Commonwealth Forests. Though

local on this island, many occur in sufficient numbers so that they are not rare. Two are also in Vieques, and 1 also has been found in St. Croix.

Two additional endemic species have been planted in the Caribbean National Forest: 151. *Montezuma speciosissima* Sessé & Moc., maga. 389. *Sabinea florida* (Vahl) DC., retama, wattapania.

The number of endemic species has been reduced slightly by reduction to synonymy under widely ranging species. Also, a few former endemics have been found also on other islands.

- 4. *Acrocomia media* O. F. Cook, corozo, prickly-palm, Puerto Rico acrocomia
- 9. *Roystonea borinquena* O. F. Cook, palma real, royalpalm, Puerto Rico royalpalm (not rare; also Vieques, St. Croix, and Tortola)
- 49. *Ocotea moschata* (Meisn.) Mez, nuez moscada (not rare)
- 57. *Hirtella rugosa* Pers., icaquillo (not rare)
- 129. *Sapium laurocerasus* Desf., tabaiba (not rare)
- 165. *Rheedia portoricensis* Urban, palo de cruz (not rare; also Vieques)
- 177. *Daphnopsis philippiana* Krug & Urban, majagua brava (not rare)
- 185. *Calyptanthus krugii* Kiaersk., limoncillo (not rare)
- 191. *Eugenia stahlia* (Kiaersk.) Krug & Urban, guayabota (not rare)
- 196. *Calycogonium squamulosum* Cogn., jusillo (not rare)
- 197. *Heterotrichum cymosum* (Wendl.) Urban, camasey peludo (not rare)
- 222. *Cordia borinquensis* Urban, muñeco (not rare)
- 248. *Rondeletia portoricensis* Krug & Urban, juam tomás (not rare)
- 255. *Nephelea portoricensis* (Spreng.) Tryon, helecho gigante espinoso, tree-fern (not rare)
- 256. *Alsophila bryophila* Tryon, helecho gigante de la sierra, tree-fern (not rare)
- 280. *Piper blattarum* Spreng., higuillo (not rare)
- 301. *Urera chlorocarpa* Urban, ortiga, stinging nettle
- 311. *Coccoloba pyrifolia* Desf., uvera (not rare)
- 312. *Coccoloba rugosa* Desf., ortegón
- 334. *Nectandra sintenisii* Mez, laurel amarillo (not rare)
- 336. *Ocotia portoricensis* Mez, laurel de paloma (not rare) (reported long ago from Cuba)
- 411. *Simarouba tulae* Urban, aceitillo cimarrón (not rare)
- 420. *Byrsonima wadsworthii* Little, almendrillo (not rare)
- 472. *Maytenus elongata* (Urban) Britton
- 485. *Meliosma obtusifolia* (Bello) Krug & Urban, arroyo (collected long ago in Luquillo Mountains)
- 515. *Ternstroemia stahlia* Krug & Urban, mamey del cura (not rare)
- 516. *Ternstroemia subsessilis* (Britton) Kobuski
- 522. *Pleodendron macranthum* (Baill.) v. Tiegh., chupacallos (collected last in 1940)
- 568. *Eugenia eggersii* Kiaersk., guasábara
- 584. *Psidium sintenisii* (Kiaersk.) Alain, hoja menuda
- 605. *Miconia pachyphylla* Cogn., camasey racimoso (not rare)
- 607. *Miconia pycnoneura* Urban, camasey (not rare)
- 611. *Miconia sintenisii* Cogn., camasey (not rare)
- 619. *Tetrazygia biflora* (Cogn.) Urban, camasey (not rare)

- 620. *Tetrazygia stahlii* Cogn., camasey
- 624. *Dendropanax laurifolius* (E. March.) R. C. Schneid., gongolí (not rare)
- 625. *Didymopanax gleasonii* Britton & Wilson, yuquilla
- 631. *Ardisia glauciflora* Urban, mameyuelo
- 635. *Wallenia pendula* (Urban) Mez, jacanillo
- 652. *Symplocos micrantha* Krug & Urban, aceitunilla
- 679. *Callicarpa ampla* Schauer, capá rosa (recorded long ago from St. Thomas)
- 694. *Geotzea elegans* Wydler, matabuey
- 696. *Solanum drymophilum* O. E. Schulz, erubia
- 743. *Psychotria maleolens* Urban, cachimbo de gato (not rare)
- 750. *Eupatorium portoricense* Urban, guerrero (not rare; also Vieques)

3. Trees of Caribbean National Forest Classed as Rare in Puerto Rico but Native Beyond

The 20 species of this list have a wider distribution also on other islands beyond. These border or peripheral species found nowhere else in the United States are rare in Puerto Rico. They merit protection, though not in danger of extinction.

- 254. *Cyathea wilsonii* (Hook.) Proctor
- 300. *Urera caracasana* (Jacq.) Gaud. (not found in recent years)
- 325. *Aniba bracteata* (Nees) Mez
- 339. *Persea urbaniana* Mez
- 341. *Phoebe montana* (Sw.) Griseb.
- 353. *Prunus occidentalis* Sw.
- 417. *Bunchosia glandulifera* (Jacq.) H.B.K.
- 421. *Malpighia fucata* Ker
- 436. *Ditta myricoides* Griseb.
- 450. *Sapium jamaicense* Sw.
- 489. *Rhamnus sphaerosperma* Sw.
- 510. *Ouratea striata* (v. Tiegh.) Urban
- 511. *Cleyera albopunctata* Griseb.) Krug & Urban
- 528. *Laetia procera* (Poepp. & Endl.) Eichl.
- 529. *Lunania buchii* Urban
- 593. *Conostegia hotteana* Urban & Ekman
- 599. *Miconia affinis* DC. (not collected by authors)
- 683. *Cornutia pyramidata* L. (collected in Luquillo Mts. in 1881)
- 695. *Solanum antillarum* O. E. Schulz
- 724. *Exostema sanctae-luciae* (Kentish) Britton (collected by Alain Liogier in 1963)

ANNOTATED LIST OF TREE SPECIES EXPLANATION OF ABBREVIATIONS

The general notes about each species can be grouped and abbreviated for convenience and reduction in space. The arrangement involves four classifications, separated by commas. Abbreviations are mostly initial letters or a series of numbers. The four classifications are: size,

abundance, forest type, and range. Occasionally a species is recorded within more than one group. The classification with abbreviations and explanations follow.

Size

Average heights of mature trees.

- L Large, more than 70 ft. (21 meters)
- M Medium, 30-70 ft. (9-21 meters)
- Sm Small, less than 30 ft. (9 meters)
- Sh Shrub, sometimes small tree more than 15 ft. (4 1/2 meters).

Abundance

- A Abundant.
- Cm Common.
- U Uncommon or scattered.
- R Rare.
- VR Very rare.
- E Endemic, native only within Puerto Rico.

Forest types

Altitudes of zones are approximate.

- Mc Moist coastal forest, northern lowland below 500 ft. (about 150 meters).
- T Tabonuco type, lower mountain or lower Luquillo Forest, foothills and slopes below 2,000 feet (about 600 meters).
- C Colorado type, upper montane or upper Luquillo Forest, valleys and gradual slopes above 2,000 ft. (about 600 meters).
- P Palm type, steep slopes and arroyos above 1,500 ft. (about 450 meters).
- D Dwarf forest type ("elfin woodland"), isolated peaks and high ridges above 2,500 ft. (about 750 meters), a subdivision of colorado type with fewer species.
- l Introduced, not native within Luquillo Mountains. Planted, such as along roads and around houses and in forestry tests.

Geographic Distribution

The geographic distribution or range is indicated by number in parenthesis (1-9). Explanation is under a separate heading. Species introduced in Luquillo Mountains, several of which are native elsewhere on the island, are designated by (1).

TREES OF CARIBBEAN NATIONAL FOREST, PUERTO RICO LIST OF SPECIES

Tree-fern family (Cyatheaceae)

256. *Alsophila bryophila* Tryon, helecho gigante de la sierra, tree-fern. Sm, Cm, C, P, D, E, (8). Common on peaks and ridges above 2,000 feet altitude in upper Luquillo Forest and dwarf forest and in understory of palm forest. Endemic to high mountains of Puerto Rico. Named as a new species in 1972. Long known as *Cyathea pubescens* Mett. (now *Nephelea pubescens* (Mett.) Tryon), which is confined to Jamaica.

251. *Cyathea aquilina* (Christ) Domin (*Alsophila aquilina* Christ), helecho gigante, tree-fern. Sh-Sm, R, T, (5).

1. *Cyathea aroborea* (L.) J. E. Smith, helecho gigante, tree-fern. Sm, A, T, C, (3). Understory tree and also very common in open areas, such as ravines, banks, and roadsides.

253. *Cyathea escuquensis* (Karst.) Domin (*Hemitelia escuquensis* Karst.), helecho gigante, tree-fern. Sh, U, T, C, (2).

252. *Cyathea tenera* (J. E. Smith) Moore (*C. brittoniana* Maxon), helecho gigante, tree-fern. Sm, R, C, D, (4).

254. *Cyathea wilsonii* (Hook.) Proctor (*Hemitelia wilsonii* Hook.), helecho gigante, tree-fern. Sh, R, T, (5).

255. *Nephelea portoricensis* (Spreng.) Tryon (*Cyathea portoricensis* Spreng.), helecho gigante espinoso, tree-fern. Sm, Cm, C, E, (8). Common locally in understory. Endemic to high mountains of Puerto Rico.

Podocarp family (Podocarpaceae)

2. *Podocarpus coriaceus* L. C. Rich (*Nageia coriacea* (L. C. Rich) Kuntze), caobilla, podocarp. D, Sh, R, (8). Rare and local as a shrub 4 feet high in dwarf forest east of El Yunque summit. A medium-sized tree in mountain forest of western Puerto Rico, almost confined to Maricao Forest. The only native conifer in Puerto Rico.

Araucaria family (Araucariaceae*)

258. *Agathis robusta* (C. Moore) F. M. Bailey*, kauri, Queensland kauri. M, I, R. Planted from sea level to 2,500 feet altitude in moist areas in forestry test and as a handsome ornamental.

Pine family (Pinaceae*)

260. *Pinus caribaea* Morelet*, pino hondureño, Caribbean pine. L, I. Grown in forest plantations and as an ornamental.

Grass family (Graminaea)

3. *Bambusa vulgaris* Schrad.,* bambú, common bamboo. M, Cm, I. Clustered stems 30-50 feet high and 2-4 inches in diameter. Commonly planted in moist soil, especially at roadsides.

Palm family (Palmae)

4. *Acrocomia media* O. F. Cook (*A. aculeata* auth.), corozo, prickly-palm. M, U, Mc, E, (7). Endemic to Puerto Rico and St. Thomas.

5. *Aiphanes acanthophylla* (Mart.) Burret (*Bactris acanthophylla* Mart.), palma de coyor. M, U, T, E (8). El Verde. Endemic to Puerto Rico.

6. *Cocos nucifera* L.,* palma de coco, coconut. M, U, I.

7. *Prestoea montana* (R. Grah.) Nichols. (*Euterpe globosa* Gaertn.), palma de sierra, sierra palm. Sm-M, A, P, (4). Common to abundant and forming palm forests in upper mountains, descending in ravines to about 1,500 feet altitude.

9. *Roystonea borinquena* O. F. Cook, palma real, royal palm, Puerto Rico royalpalm. M, Cm, T, E, (7). Endemic to Puerto Rico, Vieques, St. Croix and Tortola.

Casuarina family (Casuarinaceae*)

11. *Casuarina equisetifolia* L.,* casuarina, Australian beefwood, horsetail casuarina. L, I (T).

Pepper family (Piperaceae)

12. *Piper aduncum* L., higuillo. Sh-Sm, A, T, (1). Abundant in forest openings roadsides, pastures, and abandoned fields, often forming pure thickets.

279. *Piper amalago* L., higuillo de limón. Sh, Cm, T, (3).

280. *Piper blattarum* Spreng., higuillo (E). Sh-Sm, U, C, E, (8). Endemic to Puerto Rico but recorded also from St. Thomas nearly a century ago.

Chloranthus family (Chloranthaceae)

13. *Hedyosmum arborescens* Sw., azafrán. Sm-Sh, U, C, (4).

Waxmyrtle family (Myricaceae)

284. *Myrica holdridgeana* Lundell (Contrib. Univ. Mich. Herbarium 7:5. 1942), palo de cera. Sh, R, C, D, E, (9). Rare and local in upper Luquillo Forest and dwarf forest of ridges and peaks at altitudes of 2,500-3,000 feet and above. Endemic to Luquillo Mountains. (also in Guilarte and Monte del Estado.)

Elm family (Ulmaceae)

16. *Trema micrantha* (L.) Blume, guacimilla, false jacocalalu, Florida trema. M, Cm, T, (1).

Mulberry family (Moraceae)

17. *Artocarpus altilis* (Parkinson) Fosberg* (*A. communis* J.R. & G. Forst), panapen, pana de pepitas, breadfruit. M, I. (L) (C).

20. *Cecropia peltata* L., yagrumo hembra, trumpet-tree. M, A, L, C, (1). Abundant in openings and secondary forest.

22. *Ficus citrifolia* Mill. (*F. laevigata* Vahl), jagüey blanco, shortleaf fig. M, L, C, (1).

24. *Ficus perforata* L. (*F. sintenisii* Warb.), jagüey colorado. M, Cm, C, L, (1). Formerly listed under the second name as endemic to Puerto Rico.

295. *Ficus trigonata* L. (*F. crassinervia* Desf.), jagüey, wild fig. L, Cm, T, (1).

Nettle family (Urticaceae)

299. *Urera baccifera* (L.) Gaud., ortiga brava, stinging nettle. Sh, Cm, T, (1).

300. *Urera caracasana* (Jacq.) Gaud., ortiga colorada, stinging nettle. Sm, R, (1). Not found in Puerto Rico in recent years.

301. *Urera chlorocarpa* Urban, ortiga, stinging nettle. Sh, R, T, C, E (8). Rare in wet soil, such as long revines, lower and upper Luquillo forests at 1,000-3,000 feet altitude. Endemic to Puerto Rico.

Buckwheat family (Polygonaceae)

311. *Coccoloba pyrifolia* Desf., uvera. Sh-Sm, C, T, E, (8). Endemic but widely distributed in Puerto Rico.

312. *Coccoloba rugosa* Desf., ortegón. Sm, R, Mc, T, E, (8). Local in moist coastal and lower Luquillo Forest from sea level to 1,800 feet altitude. One area is in Barrio Maizales above Naguabo. Endemic to Puerto Rico but recorded from St. Thomas more than a century ago.

27. *Coccoloba swartzii* Meisn. (*C. borinquensis* Britton), ortegón. M, Cm, T, C, D, (4). The common form of Puerto Rican mountains formerly was listed under the second name as endemic.

28. *Coccoloba uvifera* (L.) L., uva de playa, seagrape. Sh-Sm, Cm, Mc, T, (1). Perhaps introduced in Luquillo Mountains.

Four-o'clock family (Nyctaginaceae)

33. *Guapira fragrans* (Dum.-Cours.) Little (*Torrubia fragrans* (Dum.-Cours.) Standley), corcho, black mampoo. M, Cm, Mc, T, (2).

32. *Pisonia subcordata* Sw., corcho blanco, water mampoo. L, Cm, T, (6).

Magnolia family (Magnoliaceae)

35. *Magnolia splendens* Urban, laurel sabino. L, U, T, E, C, (9). Endemic to upper Luquillo Mountains, mostly within the Caribbean National Forest.

Annona family (Annonaceae)

37. *Annona muricata* L.,* guanábana, soursop. Sm, I.

38. *Annona reticulata* L.,* corazón, custard-apple. Sm, Cm, I.

41. *Guatteria blainii* (Griseb.) Urban, haya minga. M, U, C, (5).

321. *Guatteria caribaea* Urban, haya blanca. M, U, T, (6).

323. *Oxandra laurifolia* (Sw.) A. Rich, yaya, lancewood. Sm, U, T, (4).

Laurel family (Lauraceae)

325. *Aniba bracteata* (Nees) Mez, canelillo. M, R, T, C, (6).

42. *Beilschmiedia pendula* (Sw.) Benth. & Hook. f. (*Hufelandia pendula* (Sw.) Nees), guajón. M-L, U, T, (4).

332. *Nectandra membranacea* (Sw.) Griseb., laurel prieto. L, U, T, (1).

333. *Nectandra patens* (Sw.) Griseb., laurel geo colorado. Sh-M, Cm, Mc, T, (4).

334. *Nectandra sintenisii* Mez, laurel amarillo. L-M, U, T, E, (8). Endemic to Puerto Rico but recorded long ago from St. Thomas.

47. *Ocotea floribunda* (Sw.) Mez, laurel espada. M, U, T, (2).

48. *Ocotea leucoxylon* (Sw.) Mez, laurel geo. Sm-M, A, Mc, T, (4).

49. *Ocotea moschata* (Meisn.) Mez, nuez moscada. L, Cm, T, E, (8). Lower mountain forest but commonest in and near transition to upper mountain forests. Endemic to Puerto Rican mountains.

336. *Ocotea portoricensis* Mez, laurel de paloma. M, U, C, E, (8). Endemic to high mountains of Puerto Rico but reported long ago from Cuba.

50. *Ocotea spathulata* Mez, nemocá. M, U, C, D, (5). Known only from Cuba and Puerto Rico.

51. *Persea americana* Mill.* (*P. persea* (L.) Cockerell), aguacate, avocado. Sm-M, I.

339. *Persea urbaniana* Mez (*P. portoricensis* Britton & Wilson), aguacatillo. Sm-M, U, T, (4).

340. *Phoebe elongata* (Vahl) Nees, laurel avispillo. Sm-L, U, T, (4).

341. *Phoebe montana* (Sw.) Griseb., avispillo. M, R, T, (5).

Hernandia family (Hernandiaceae)

52. *Hernandia sonora* L., mago. L-M, U, Mc, (1). Planted along highway south of Mameyes.

Brunellia family (Brunelliaceae)

55. *Brunellia comocladifolia* Humb. & Bonpl., palo bobo. Sm, U, C, (2).

Cunonia family (Cunoniaceae)

56. *Weinmannia pinnata* L., oreganillo. Sm-Sh, U, D, (1).

Rose family (Rosaceae)

349. *Chrysobalanus icaco* L., hicaco, coco-plum. Sh, U, Mc, T, (1).

57. *Hirtella rugosa* Pers., icaquillo. Sm, Cm, T, C, P, E, (8). Understory tree, endemic to mountains of Puerto Rico.

351. *Hirtella triandra* Sw. Sh-Sm, R, T, (1).

353. *Prunus occidentalis* Sw., almendrón, West Indies laurelcherry. L, R, Mc, T, C, (1).

Legume family (Leguminosae)

Mimosa subfamily (Mimosoideae; Mimosaceae)

60. *Albizia lebbbeck* (L.) Benth.,* acacia marilla, tibet, lebbek. M, I.

62. *Inga fagifolia* (L.) Willd. (*I. laurina* (Sw.) Willd.), guamá, "sweetpea". L-M, Cm, C, P, Mc, T, (1).

64. *Inga vera* Willd., guaba. L-M, Cm, U, Mc, T, C, P, (5).

Cassia subfamily (Caesalpinioideae; Caesalpinaceae)

74. *Cassia siamea* Lam.,* casia de Siam, Siamese cassia. M, Cm, I. Widely planted along highways.

75. *Delonix regia* (Bojer) Raf.,* flamboyán, flamboyant-tree. Sm-M, Cm, I. Widely planted along highways.

76. *Hymenaea courbaril* L., algarrobo, West-Indian-Locust, courbaril. L-M, U, Mc, (1).

78. *Peltophorum inerme* (Roxb.) Naves* (*P. ferrungineum* (Decne.) Benth.), flamboyán amarillo, yellow flamboyant. M-L, I.

Pea subfamily (Faboideae; Fabaceae)

81. *Andira inermis* (W. Wright) DC., moca, cabbage angelin. M-L, Cm, Mc, T, (1).

377. *Dalbergia sissoo* Roxb.,* sisu, Indian rosewood. M, I. Tested in forest plantings of El Verde.

85. *Gliricidia sepium* (Jacq.) Kunth ex Griseb.,* mata-ratón, mother-of-cocoa. Sm, I.

86. *Lonchocarpus pentaphyllus* (Poir.) DC. (*L. latifolius* (Willd.) H.B.K., retama. Sm-L, U, Mc, T, (1).

87. *Ormosia krugii* Urban, palo de matos. M, U, T, (4).

90. *Pterocarpus officinalis* Jacq., palo de pollo, swamp bloodwood. L, U, T, (1).

389. *Sabinea florida* (Vahl) DC. (*), retama, wattapania. Sh-Sm, (I). Endemic to Puerto Rico and the Virgin Islands.

Rue family (Rutaceae)

96. *Citrus aurantifolia* (L.) Swingle,* limón agrio, lime. Sh-Sm, I.

97. *Citrus aurantium* L.,* naranja agria, sour orange. Sm, I.

98. *Citrus limon* (L.) Burm. f.,* limón de cabro, lemon. Sm, I.

100. *Citrus sinensis* Osbeck,* china, sweet orange. Sm, I.

401. *Ravenia urbanii* Engler, tortugo prieto. Sm, R, C, E, (9). Rare in upper Luquillo Forest at 1,500-3,000 feet altitude. Endemic to Luquillo and Carite Mountains of eastern Puerto Rico.

102. *Zanthoxylum martinicense* (Lam.) DC., espino rubial, white-prickle, Martinique prickly-ash. L-M, U, Mc, T, (4).

Ailanthus family (Simaroubaceae)

411. *Simarouba tulae* Urban, aceitillo cimarrón. Sh-Sm, U, T, C, E, (8). Endemic to Puerto Rico.

Bursera family (Burseraceae)

106. *Dacryodes excelsa* Vahl, tabonuco. L, A, T, (6). Very large tree more than 100 feet tall, dominant and widely distributed in the virgin lower mountain forests.

107. *Tetragastris balsamifera* (Sw.) Oken, masa. L, Cm, T, (6).

Mahogany family (Meliaceae)

108. *Cedrela odorata* L. (*) cedro hembra, Spanish-cedar. L, (I). Native elsewhere in Puerto Rico (1).

109. *Guarea guidonia* (L.) Sleumer (*G. trichilioides* L.), guaraguao, American muskwood. L, A, Mc, T, (1).

413. *Guarea ramiflora* Vent., guaraguadillo. Sm, U, T, C, (5). Widely distributed in understory, mostly at middle altitudes. Almost confined to Puerto Rico but collected once in Hispaniola (Dominican Republic).

111. *Swietenia macrophylla* King,* caoba hondureña, Honduras mahogany. M-L, I. Planted extensively in public forests and as a shade tree.

112. *Swietenia mahagoni* Jacq.,* caoba dominicana, Dominican mahogany. M-L, I. Planted in public forests and as a shade tree but not native in Puerto Rico.

415. *Toona ciliata* Roem.,* tun, Burma toon. L, I. Planted in forestry tests.

114. *Trichilia pallida* Sw., gaeta. Sh-Sm, Cm, Mc, T, C, P, D, (5).

Malpighia family (Malpighiaceae)

417. *Bunchosia glandulifera* (Jacq.) H.B.K., café falso. Sm, R, T, (2). In Puerto Rico known only from southwestern slopes of Luquillo Mountains at 800-1,000 feet altitude.

115. *Byrsonima coriacea* (Sw.) DC., maricao. M, Cm, T, (2). Common in secondary forests.

420. *Byrsonima wadsworthii* Little (Phytologia 4:417, fig. 1953), almendrillo. Sm-M, R-U, T, P, D, C, E, (8). Rare and scattered but widely distributed in upper Luquillo and dwarf forests on ridges along the mountain summits mostly at 2,500-3,000 feet altitude. Endemic to high mountains of Puerto Rico.

421. *Malpighia fucata* Ker, palo bronco. Sh-Sm, U, T, (5).

Spurge family (Euphorbiaceae)

118. *Alchornea latifolia* Sw., achiotillo. M, Cm, Mc, T, C, P, (3).

119. *Alchorneopsis portoricensis* Urban, palo de gallina. Sm-M, C, T, (5). Upper and lower mountain forests in eastern half of Puerto Rico. A light-demanding tree generally found in openings and often in swampy areas. Puerto Rico and Hispaniola only.

120. *Croton poecilanthus* Urban, sabinón. Sm-M, U, C, T, E, (9). Understory tree in upper Luquillo forest and extending down into swampy areas and stream courses of lower forest. Endemic to Luquillo Mountains.

436. *Dittha myricoides* Griseb., ditta. Sm, U, C, D, (5).

437. *Drypetes alba* Poit., hueso. Sm, R, T, (4). Rare here and uncommon in other parts of Puerto Rico.

121. *Drypetes glauca* Vahl, varital. Sm, Cm, T, C, P, (4).

446. *Jatropha multifida* L.,* (*Adenoropium multifidum* (L.) Pohl), tártago emético, coralplant. Sh, I.

128. *Margaritaria nobilis* L. f. (*Phyllanthus nobilis* (L. f.) Muell.-Arg.), millo. M, Cm, Mc, T, (1).

450. *Sapium jamaicense* Sw., tabaiba. Sm-M, R, T, (3). Rare at its eastern limit in northeastern Puerto Rico only at Rosario Tract in Luquillo Mountains at 600-800 feet altitude. Also near Lares in the moist limestone forest.

129. *Sapium laurocerasus* Desf., tabaiba. M, U, T, C, E, (8). Endemic to Puerto Rico but reported long ago from St. John.

Cashew family (Anacardiaceae)

456. *Comocladia glabra* (Schultes) Spreng., carrasco. Sh-Sm, Cm, Mc, T, C, P, D, (5). Puerto Rico and Hispaniola only.

131. *Mangifera indica* L.,* mango. M-L, I. Popular planted fruit tree.

134. *Spondias mombin* L., jobo, hogplum, yellow mombin. L-M, Cm, Mc, T, (1). Perhaps naturalized rather than native.

Cyrilla family (Cyrillaceae)

136. *Cyrilla racemiflora* L., palo colorado, swamp cyrilla. M-L, A, T, C, P, D, (1). A giant tree near El Verde in the northwestern part of Luquillo Mountains has a trunk approximately 8 feet 7 inches in diameter.

Holly family (Aquifoliaceae)

461. *Ilex macfadyenii* (Walp.) Rehd., acebo de sierra. Sh-M, R, C, D, (4).

464. *Ilex sideroxyloides* Griseb., gongolín. Sm-M, R, C, (4).

465. *Ilex sintenisii* (Urban) Britton. Sh, R, D, E, (9). Endemic in upper Luquillo Forest and dwarf forest of Luquillo Mountains including Sierra de Naguabo at altitudes of 3,000-3,500 feet.

Bittersweet family (Celastraceae)

472. *Maytenus elongata* (Urban) Britton. Sm, R, T, E, (8). Rare at El Verde.

475. *Torralfasia cuneifolia* (C. Wright) Krug & Urban, boje. Sh-Sm, U, C, D, (5).

Bladdernut family (Staphyleaceae)

137. *Turpinia paniculata* Vent., sauco cimarrón. Sm-M, Cm, T, C, (1).

Soapberry family (Sapindaceae)

479. *Allophylus racemosus* Sw. (*A. occidentalis* Sw.), quiebrahacha. Sm, R-U, Mc, (1).

138. *Cupania americana* L., guara. Sm-L, Cm, T, (2).

481. *Cupania triquetra* A. Rich., guara blanca. M, R-U, Mc, (4).

139. *Matayba domingensis* (DC.) Radlk., negra lora. M, U, T, C, (5).

Sabia family (Sabiaceae)

144. *Meliosma herbertii* Rolfe, aguacatillo. M, U, T, (2).

485. *Meliosma obtusifolia* (Bello) Krug & Urban, arroyo. M, R, C, E, (8). Rare in mountains of western Puerto Rico, also collected long ago in Luquillo Mountains. Endemic to Puerto Rican mountains.

Buckthorn family (Rhamnaceae)

489. *Rhamnus sphaerosperma* Sw., West Indian buckthorn. Sh-Sm, R, C, D, (5).

Elaeocarpus family (Elaeocarpaceae)

149. *Sloanea berteriana* Choisy, motillo. L, A, T, (4). *S. amygdalina* Griseb., a rare tree in mountain forests of western Puerto Rico, has been reported doubtfully also from Luquillo Mountains.

Mallow family (Malvaceae)

496. *Hibiscus elatus* Sw.,* majó, mahoe. M, I.

497. *Hibiscus rosa-sinensis* L.,* pavona, hibiscus, Chinese hibiscus. Sh, I.

150. *Hibiscus tiliaceus* L.,* emajagua, sea hibiscus. Sm, U, T, I.

151. *Montezuma speciosissima* Sessé & Moc., (*) maga. M, U, (I), E, (8). Planted in Luquillo Mountains and endemic to Puerto Rico.

Bombax family (Bombacaceae)

153. *Ceiba pentandra* (L.) Gaertn., ceiba, silk-cotton-tree. L, U, Mc, T, (1).

154. *Ochroma pyramidale* (Cav.) Urban, guano, balsa. M-L, U, Mc, T, (1).

155. *Quararibea turbinata* (Sw.) Poir., garrocho. Sm, U, Mc, T, (2). Reported from Luquillo Mountains but common elsewhere in Puerto Rico.

Chocolate family (Sterculiaceae)

156. *Guazuma ulmifolia* Lam., guácima, jacocalalu. Sm-M, U, Mc, T, (1). Reported doubtfully from Luquillo Mountains but common elsewhere in Puerto Rico.

158. *Theobroma cacao* L.,* cacao, chocolate-tree. Sm, I.

Ochna family (Ochnaceae)

510. *Ouratea striata* (v. Tiegh.) Urban. Sh-Sm, R, C, D, (5). Known only from Puerto Rico and Cuba.

Tea family (Theaceae)

511. *Cleyera albopunctata* (Griseb.) Krug & Urban (*Erotium albopunctatum* (Griseb.) Britton). Sm, R, C, D, (5).

160. *Laplacea portoricensis* (Krug & Urban) Dyer (*Haemocharis portoricensis* Krug & Urban), maricao verde. M, R, T, E, (9). Known only from the lower Luquillo Forest region.

512. *Ternstroemia heptasepala* Krug & Urban (*Taonabo heptasepala* (Krug & Urban) Britton). Sh-Sm, R, C, D, E, (9). Rare and endemic in dwarf forest as 2,500-3,500 feet altitude on summits and ridges in Luquillo Mountains.

513. *Ternstroemia luquillensis* Krug & Urban (*Taonabo luquillensis* (Krug & Urban) Britton), palo colorado. Sm-M, R, C, E, (9). Known only from upper Luquillo Forest as about 3,000 feet altitude in Luquillo Mountains.

515. *Ternstroemia stahlia* Krug & Urban (*Taonabo stahlia* (Krug & Urban) Britton, *Taonabo pachyphylla* (Krug & Urban) Britton), mamey del cura. Sm-M, U, Mc, T, E, (8).

516. *Ternstroemia subsessilis* (Britton) Kobuski (*Taonabo subsessilis* Britton). Sh-Sm, VR, C, E, (8). Very rare in upper Luquillo and upper Cordillera Forests at 2,500-3,000 feet altitude near summits of Luquillo mountains and Monte del Estado. The type was collected at the summit of El Yunque by Britton and Bruner (of the U.S. Forest Service) in 1914.

Mangosteen family (Guttiferae)

161. *Calophyllum calaba* L. (*C. brasiliense* Camb.), (*) maría, santa-maría. M, U, (I). Native elsewhere in Puerto Rico but widely planted for ornament and shade along highways.

162. *Clusia grisebachiana* (Pl. & Triana) Alain (*C. krugiana* Urban) cupeíllo. Sm-M, Cm, C, D, (5). Known only from Puerto Rico and Hispaniola. *Clusia gundlachii* Stahl, cupeíllo de altura, is a vinelike shrub or woody vine sometimes recorded as a tree but not so observed by the authors. Known only from high mountains of Puerto Rico.

518. *Clusia minor* L., cupey de monte. Vinelike shrub or small tree, U, T, D, (2).

163. *Clusia rosea* Jacq., cupey, wild-mammee, copey clusia. M, Cm, Mc, T, (1).

164. *Mammea americana* L., (*?), mamey, mammee-apple. M, (I?). Widely planted for fruit, shade, and ornament. Apparently native in the moist coastal forest of Puerto Rico.

165. *Rheedia portoricensis* Urban (*R. acuminata* (Spreng.) Planch. & Tr., not *R. acuminata* (Ruíz & Pav.) Planch & Tr.), palo de cruz. Sm, U, Mc, T, E, (8). Known only from Puerto Rico and Vieques.

Canella family (Canellaceae)

522. *Pleodendron macranthum* (Baill.) v. Tiegh., chupacallos. Sm-M, VR, T, E, (8). Known only from mountains of Puerto Rico. First described in 1882 and placed in a distinct genus in 1899. Collected in Luquillo Mountains by foresters in 1938 and 1940 but not in recent years. A second species has been named from Haiti.

Flacourtiaceae family (Flacourtiaceae)

169. *Casearia arborea* (L. C. Rich.) Urban, rabo ratón. Sm-M, A, Mc, T, (1). Abundant and widely distributed along roadsides and in openings and thickets in moist regions.

170. *Casearia decandra* Jacq., tostado, wild honey-tree. Sh-Sm, A, Mc, T, (1).

171. *Casearia guianensis* (Aubl.) Urban, palo blanco, wild-coffee. Sm-M, U, Mc, T, (1).

172. *Casearia sylvestris* Sw., cafeíllo. Sm-M, A, Mc, T, (1). Abundant, especially in open areas, roadsides, and forest understory.

173. *Homalium racemosum* Jacq. (*H. leiogynum* Blake, *H. pleiandrum* Blake), caracolillo. L, U, C, T, Mc, (1).

528. *Laetia procera* (Poepp. & Endl.) Eichl. (*Casearia bicolor* Urban) talantrón. M, R, T, (1). Rare and local in lower Luquillo Forest at 1,500-2,000 feet altitude and in Central Cordillera near Utuado.

529. *Lunania buchii* Urban. Sm, R, T, C, (5). Rare in lower Luquillo and Cordillera Forests at 1,500-2,800 feet altitude at El Verde and Maricao Forest.

536. *Xylosma schwaneckeanum* (Krug & Urban) Urban (*Myroxylon schwaneckeanum* Krug & Urban), palo de candela. Vinelike shrub or small tree, R, T, C, E, (9). Rare in lower and upper Luquillo and Cordillera Forests at 1,500-3,000 feet altitude in eastern mountains of Puerto Rico (Luquillo and Carite).

Mezereon family (Thymelaeaceae)

540. *Daphnopsis americana* (Mill.) J. R. Johnst. (*D. caribaea* Griseb.) majagua de sierra, maho. Sm, U, T, (1).

177. *Daphnopsis philippiana* Krug & Urban, majagua brava. Sm-Sh, U, T, C, P, E, (8). Known only from upper Luquillo and Cordillera Forests of Puerto Rico.

Loosestrife family (Lythraceae)

178. *Lagerstroemia speciosa* (L.) Pers.,* reina de las flores, queen-of-flowers. Sm, I. Planted for the showy purple flowers.

Mangrove family (Rhizophoraceae)

548. *Cassipourea guianensis* Aubl. (*C. alba* Griseb., *C. elliptica* (Sw.) Poir.), palo de gongolí, murta. Sh-Sm, U, Mc, T, C, (1).

Combretum family (Combretaceae)

180. *Buchenavia capitata* (Vahl) Eichl., granadillo. L, Cm, Mc, T, (1).

184. *Terminalia catappa* L.,* almendra, Indian-almond. M, I.

Myrtle family (Myrtaceae)

185. *Calypttranthes krugii* Kiaersk., limoncillo. Sh-Sm, U, C, P, D, E, (8). Endemic to upper mountain forests of eastern and central Puerto Rico.

553. *Calypttranthes luquillensis* Alain (Bull. Torrey Bot. Club 90:189. 1963). Sh-Sm, R, T, C, E, (9). Rare and endemic in upper Luquillo Forest above 2,000 feet altitude. First collected in 1939 and named in 1963.

556. *Calypttranthes sintenisii* Kiaersk., limoncillo del monte. Sm, R, Mc, T, (4). Known only from Puerto Rico and Hispaniola.

186. *Eucalyptus robusta* J. E. Smith,* eucalipto, beakpod eucalyptus. L, I. One of the best adapted of more than 30 species of *Eucalyptus* which have been introduced from Australia. The wood is suitable for general construction. The trees are planted occasionally for shade and ornament.

560. *Eucalyptus resinifera* J. E. Smith,* eucalipto, kino eucalyptus. L, I.

562. *Eugenia biflora* (L.) DC. (*E. lancea* Poir.), pitangueira. Sm, Cm, Mc, T, (1).

564. *Eugenia borinquensis* Britton, guayabota de sierra. (E) Sh-Sm, Cm, D, E, (9). Locally common in dwarf forest and thickets on or near the ridges and peaks in the upper Luquillo and Cordillera Forests at 2,500-3,500 feet. Abundant near Mount Britton and El Yunque. Also in eastern Cordillera at Sierra de Cayey. Endemic to eastern mountains of Puerto Rico.

187. *Eugenia domingensis* Berg, (*E. aeruginea* DC.), guasábara. M, U, Mc, T, (4).

568. *Eugenia eggertii* Kiaersk., guasábara. Sh-Sm, R, T, C, (8). Rare as understory shrub or tree at 1,000-3,000 feet altitude. Endemic to mountains of Puerto Rico.

570. *Eugenia haematocarpa* Alain (Bull. Torrey Bot. Club 90: 190. 1963), uvillo. Sm, R, T, E, (9). Rare in lower slopes of Luquillo Forest at 1,000-1,500 feet altitude in Luquillo Mountains. Collected at Barrio Maizales, El Valle, Naguabo, and at El Verde, Río Grande. Endemic to Luquillo Mountains. Discovered in 1939.

188. *Eugenia jambos* L.* (*Jambos jambos* (L.) Millsp., *Syzygium jambos* (L.) Alton), pomarrosa, rose-apple. Sm, Cm, I, T. Naturalized in moist regions of Puerto Rico. Locally abundant, spreading like a weed, and forming pure stands or dense thickets, especially along streams.

191. *Eugenia stahlii* (Kiaersk.) Krug & Urban, guayabota. M, Cm, T, C, E, (8). Commonest on the transition zone between the lower and upper mountain forests between 1,500 and 3,500 feet altitude. Endemic to mountains of Puerto Rico.

589. *Marlierea sintenisii* Kiaersk (*Plinia* (?) *sintenisii* (Kiaersk.) Britton), beruquillo. Sh-Sm, R, D, (9). Endemic in dwarf forest at 2,500 feet altitude in Luquillo Mountains.

192. *Myrcia deflexa* (Poir.) DC., cieneguillo. M, Cm, T, C, (2).
585. *Myrcia fallax* (A. Rich.) DC. (*M. berberis* DC.), hoja menuda. Sm, U, C, D, (2). High mountains of eastern and central part.
550. *Myrcia leptoclada* DC. (*Aulomyrcia leptoclada* (DC.) Berg), guayabacón. Sm, U, T, Mc, P, (1). From sea level to 1,500 feet.
193. *Myrcia splendens* (Sw.) DC., hoja menuda. Sm-Sh, Cm, Mc, T, (2). Common in forests and openings.
194. *Pimenta racemosa* (Mill.) J. W. Moore, malagueta, bay-rum-tree. M, U, Mc, T, P, (2).
195. *Psidium guajava* L.,* guayaba, common guava. Sh-Sm, I, T. Cultivated fruit tree, forming thickets and spreading in pastures.
584. *Psidium sintenisii* (Kiaersk.) Alain (*Calyptrópsidium sintenisii* Kiaersk., *Mitropsidium sintenisii* (Kiaersk.) Burret), hoja menuda. Sm, R, C, E, (8). Endemic at 2,500-3,000 feet altitude in Luquillo Mountains only.

Melastome family (Melastomataceae)

196. *Calycogonium squamulosum* Cogn., jusillo. M, U, T, C, P, D, E, (8). Endemic to upper mountain forests in eastern and central Puerto Rico.
592. *Clidemia umbrosa* (Sw.) Cogn. Sm, R, (6). This species of the Lesser Antilles was collected by Woodbury in nearby Carite Forest, the only Puerto Rican locality, and may be sought in the Luquillo Mountains.
593. *Conostegia hotteana* Urban & Ekman. Sm-M, VR, T, (5). Found in Luquillo Mountains at 1,000-1,500 feet altitude in 1966 (Howard 1966). Also in Carite Forest at 2,000 feet altitude. Known only from Hispaniola (southern Haiti) and mountains of eastern Puerto Rico.
594. *Henriettea fascicularis* (Sw.) Gómez (*Henriettella fascicularis* (Sw.) C. Wright), camasey peludo. Sm-M, U, Mc, T, (3). Uncommon and scattered in foothills and lower Luquillo Forest at altitudes above 800 feet.
595. *Henriettea macfadyenii* (Triana) Alain (*Henriettella macfadyenii* Triana), camasey. M, R, T, C, P, (E), (5). Rare in mountain forests including lower Luquillo and lower Cordillera (including Toro Negro Forest) at 2,000 feet altitude. This species was discovered in Jamaica by James Macfadyen (1798-1850) but apparently was not collected again there. Thus, it is known only from Puerto Rico now.
197. *Heterotrichum cymosum* (Wendl.) Urban, camasey peludo. Sm, T, C, E, (8). Common and widely distributed in open areas, such as roadsides in the mountain forest regions of Puerto Rico. Widespread but endemic to the island.
598. *Mecranium amygdalinum* (Desr.) C. Wright, camasey almendro. Sh-Sm, T, C, P, D, (5). Widely distributed through mountain forest middle and higher altitudes, 1,500-3,000 feet.
599. *Miconia affinis* DC. (*M. microcarpa* DC.), camasey. Sh-Sm, R, (1). Rare in Puerto Rico, recorded from Luquillo Mountains and from Río Piedras west to Mayaguez. Not collected by the authors.
600. *Miconia foveolata* Cogn., camasey. Sh-Sm, common locally, D, C, E, (9). Endemic to dwarf and upper Luquillo forests at 2,500-3,500 feet altitude in Puerto Rico.
601. *Miconia impetiolearis* (Sw.) D. Don, camasey de costilla. Sm-Sh, U, Mc, T, (1). At 500-2,000 feet altitude.
602. *Miconia laevigata* (L.) DC., camasey de paloma. Sh-Sm, Cm, T, C, (1). Common and widespread from near sea level to 2,600 feet altitude.

603. *Miconia mirabilis* (Aubl.) L. O. Wms. (*M. guianensis* (Aubl.) Cogn., *Tamonea guianensis* Aubl.), camasey cuatrocanales. Sm, U, L, T, C, (1). Widespread at 500-3,000 feet altitude throughout the mountains of Puerto Rico.

605. *Miconia pachyphylla* Cogn., camasey racimoso. Sh-Sm, U, D, C, E, (8). Endemic to high mountains at 2,000-4,000 feet altitude in Puerto Rico.

198. *Miconia prasina* (Sw.) DC., camasey. Sh-Sm, Cm, Mc, T, (1).

607. *Miconia pycnoneura* Urban, camasey. Sh-Sm, R, D, E, (8). Endemic to mountain tops above 3,000 feet altitude in Puerto Rico.

608. *Miconia racemosa* (Aubl.) DC., camasey felpa. Sh, C, Mc, L, C, (2). From sea level to 3,000 feet altitude.

610. *Miconia serrulata* (DC.) Naud. (*Tamonea macrophylla* (D. Don) Krasser), camasey. Sh-Sm, U, Mc, T, (1). Luquillo foothills and mountains from near sea level to 1,500 feet altitude.

611. *Miconia sintenisii* Cogn., camasey. Sh-Sm, U, P, D, E, (8). Endemic to dwarf forest at 2,500-4,000 feet altitude in high mountains of Puerto Rico.

613. *Miconia tetrandra* (Sw.) D. Don, camasey. Sm-M, Cm, T, C, P, (4).

619. *Tetrazygia biflora* (Cogn.) Urban (*Menendezia biflora* (Cogn.) Britton), camasey, M, U, C, T, E, (8). Local and scattered in middle to upper mountain forests at 1,500-3,000 feet altitude. Endemic to eastern and central mountains of Puerto Rico.

620. *Tetrazygia stahlia* Cogn. (*Menendezia stahlia* (Cogn.) Britton), camasey. M, R, T, E, (8). Rare on uncommon and endemic to eastern and central mountains of Puerto Rico.

621. *Tetrazygia urbanii* Cogn. (*Menendezia urbanii* (Cogn.) Britton), camasey. Sm, R, T, E, (9). Endemic to lower Luquillo Forest at 1,000-2,000 feet altitude in eastern mountains.

Ginseng family (Araliaceae)

200. *Dendropanax arboreus* (L.) Decne. & Planch., pollo. M, Mc, C, T, (1).

624. *Dendropanax laurifolius* (E. March.) R. C. Schneid., gongolí. Sm-M, U, T, P, C, E, (8). Endemic to forests at middle altitudes of 1,500-3,000 feet in Puerto Rico.

625. *Didymopanax gleasonii* Britton & Wilson, yuquilla. Sh-Sm, R, C, D, E, (8). Rare in Luquillo Mountains where only 2 trees were found. Uncommon in upper Cordillera and dwarf forests above 1,500 feet altitude in central and western mountains. Endemic to mountains of Puerto Rico.

201. *Didymopanax morototoni* (Aubl.) Decne. & Planch., yagrumo macho, matchwood. M, U, Mc, T, (1).

Myrsine family (Myrsinaceae)

631. *Ardisia glauciflora* Urban (*Ikacorea glauciflora* (Urban) Britton), mameyuelo. Sm, R, T, C, P, E, (8). Rare or uncommon and endemic to mountains of Puerto Rico.

632. *Ardisia luquillensis* (Britton) Alain (*Ikacorea luquillensis* Britton), mameyuelo. Sm, R, D, E, (9). Endemic in dwarf forest at about 3,000-3,400 feet altitude on summits of peaks of Luquillo Mountains and Carite. Named in 1925 from incomplete specimens collected two years earlier. Flowers were found by the Forest Service in 1940.

633. *Grammadenia sintenisii* (Urban) Mez. Sh, R, D, E, (9). Endemic to dwarf forest at 2,500-3,500 feet altitude in Luquillo Mountains.

203. *Rapanea coriacea* (Sw.) Mez (*R. ferruginea* (Ruíz & Pav.) Mez, *Myrsine coriacea* (Sw.) R. Br. ex Roem. & Schult.), mantequero. Sm, Cm, Mc, T, C, P, D, (1).

635. *Wallenia pendula* (Urban) Mez (*Petesioides pendulum* (Urban) Britton), jacanillo. Sh-Sm, R, D, C, E, (8). Endemic to high mountains at 2,000-3,500 feet altitude in Puerto Rico.

Sapodilla family (Sapotaceae)

205. *Chrysophyllum argenteum* Jacq., lehecillo. Sm, U, Mc, T, (2).

206. *Chrysophyllum cainito* L., * caimito, star-apple. Sm-M, I. Planted and escaping from cultivation in Puerto Rico but probably not native.

209. *Manilkara bidentata* (A. DC. Chev. (*M. nitida* (Sessé & Moc.) Dubard), ausubo, balata. L, Cm, Mc, T, (2). One of the dominant species in the lower Luquillo Forest. A very large tree can be seen along the Big Tree Trail in La Mina Recreation Area. In the past, ausubo probably was the most important timber of Puerto Rico.

211. *Micropholis chrysophylloides* Pierre, caimitillo, M, A, T, C, P, D, (6). A very common and widely distributed species in the upper mountain forest.

212. *Micropholis garciniifolia* Pierre, caimitillo verde. M, Cm-U, T, P, D, C, (9). Endemic to upper mountain forests of eastern Puerto Rico in Luquillo and Carite Mountains.

213. *Pouteria multiflora* (A. DC.) Eyma (*Lucuma multiflora* A. DC.), jácana. L, Cm, Mc, T, (4).

Storax family (Styracaceae)

650. *Styrax portoricensis* Krug & Urban, palo de jazmín. M, VR, T, E, (9). Very rare and endemic in Luquillo and Carite Mountains. Named in 1892 from specimens collected at Sierra de Naguabo and Yabucoa in 1885. Rediscovered in 1935 and 1950. Found by Woodbury along Espíritu Santo River and Carite Forest.

Sweetleaf family (Symplocaceae)

215. *Symplocos martinicensis* Jacq. (*S. polyantha* Krug & Urban), aceituna blanca, candlewood. Sm-M, U, T, (1).

652. *Symplocos micrantha* Krug & Urban, aceitunilla. Sm, R, C, D, (8). Endemic to dwarf forest at 2,500-4,000 feet altitude on mountain tops in eastern and central Puerto Rico.

Olive family (Oleaceae)

656. *Fraxinus uhdei* (Wenzig) Lingelsh., * Fresno, tropical ash. M, I. Planted mostly at high altitudes in forestry tests.

657. *Haenianthus salicifolius* Griseb. (*H. obovatus* Krug & Urban), palo de hueso. Sm, Cm, C, P, D, (5). Common in dwarf forests above 2,500 feet altitude to mountain summits. Formerly listed under the second name as endemic to Puerto Rico.

216. *Linociera domingensis* (Lam.) Knobl. (*Mayepea domingensis* (Lam.) Krug & Urban), hueso blanco. M, U, Mc, T, (3).

Dogbane family (Apocynaceae)

218. *Plumeria rubra* L.,* frangipani. Sm, I. Planted for the very large, tubular, red, yellow, or white flowers.

667. *Tabernaemontana citrifolia* L. (*T. oppositifolia* (Spreng.) Urban), palo lechoso. Sm-Sh, R, Mc, T, (4). The plants of Puerto Rico were named as an endemic species, afterwards united with that of nearby islands on both sides.

Borage family (Boraginaceae)

221. *Cordia alliodora* Ruíz & Pav.) Oken (*Cerdana alliodora* Ruíz & Pav.), capá prieto, capa. M, Cm, Mc, T, (1).

222. *Cordia borinquensis* Urban, muñeco. Sm, U, L, C, E, (8). An understory tree endemic to mountain forests of Puerto Rico.

224. *Cordia sulcata* DC., moral, white manjack. M, Cm, Mc, T, C, (4). Common and widespread in moist forest at all altitudes. Characteristic of openings and second-growth forests.

Verbena family (Verbenaceae)

678. *Aegiphila martinicensis* Jacq., capaillo. Sm, R, T, (2). Rare in foothills of Luquillo Mountains below 800 feet altitude.

679. *Callicarpa ampla* Schauer, capá rosa. Sh-M, R, T, E, (8). Endemic to mountain forests of Puerto Rico. Recorded long ago from St. Thomas.

226. *Citharexylum caudatum* L., péndula de sierra. Sh-Sm, U, C, D, (1).

227. *Citharexylum fruticosum* L., péndula, pasture fiddlewood, Florida fiddlewood. Sm, A, Mc, T, (1).

683. *Cornutia pyramidata* L. Sh, VR, (3). Very rare, collected in Luquillo Mountains only in 1881. Found afterwards in Barcelona by Woodbury.

228. *Petitia domingensis* Jacq., capá blanco. M, U, Mc, T, (5).

229. *Tectona grandis* L. f.,* teca, teak. M-L, I. Grown in forestry tests and for ornament at low altitudes.

230. *Vitex divaricata* Sw., higüerillo, white fiddlewood. M, Cm, Mc, T, (2).

Nightshade family (Solanaceae)

686. *Acnistus arborescens* (L.) Schlecht., gallinero. Sh, U, C, (1). Uncommon and scattered in opening and clearings at 1,500-3,000 feet altitude in mountains.

687. *Brunfelsia americana* L., aguacero. Sh, U, T, (4). Planted in gardens as an ornamental.

689. *Brunfelsia lactea* Krug & Urban, vega blanca. Sh-Sm, R, D, E, (9). Rare and local in dwarf forest at 3,000-3,500 feet altitude in Luquillo Mountains and Monte Torito near Cayey. Endemic to high mountains of eastern Puerto Rico.

690. *Brunfelsia portoricensis* Krug & Urban. Sh, R, T, E, (9). Rare and endemic in lower Luquillo Forest at 1,500-1,800 feet altitude.

692. *Cestrum macrophyllum* Vent., galán del monte. Sh, Cm, T, C, D, (5). Known from Puerto Rico and Hispaniola only.

694. *Goetzea elegans* Wydler, matabuey (E, VR). This very rare endemic has been collected in the northern foothills of Luquillo Mountains and at Jiménez near Río Grande, north of these mountains and outside the National Forest boundary.

695. *Solanum antillarum* O. E. Schulz. Sh-Sm, R, C, (4). Upper mountain forests including understory, openings, and cutover areas at altitudes mostly 1,500-3,500 feet in high mountains. First collected in Puerto Rico in 1950.

696. *Solanum drymophilum* O. E. Schulz, erubia. Sh-Sm, VR, C, E, (8). Endemic to mountains of Puerto Rico at middle and high altitudes about 2,500 feet.

231. *Solanum rugosum* Dunal, tabacón. Sh, Cm, Mc, T, (1). Open areas, such as roadsides, thickets, plantations, and river banks.

699. *Solanum torvum* Sw. (*S. ficifolium* Ort.), berenjena cimarrona, turkey-berry. Sh, A, Mc, T, (1). Abundant weed in open areas waste places, and thickets of all forest types except high peaks, from sea level to 3,000 feet altitude.

Bignonia family (Bignoniaceae)

700. *Catalpa longissima* (Jacq.) Sims* (*Macrocatalpa longissima* (Jacq.) Britton), roble dominicano, Haiti catalpa. M-L, I. In forestry, tested and promising on lower slopes of Luquillo Forest. Also a rare ornamental.

234. *Spathodea campanulata* Beauv.,* tulipán africano, African tuliptree. L, I. Ornamental and shade tree.

236. *Tabebuia heterophylla* (DC.) Britton (*T. pallida* (Lindl.) Miers), roble blanco, “white-cedar.” Sm-M, C, Mc, T, (4). Widespread in forests, abandoned pastures, secondary forests, forest plantations, and along roadsides except at high altitudes.

237. *Tabebuia rigida* Urban, roble de sierra. Sm-M, U, C, D, E, (9). Endemic to high altitudes of Luquillo Mountains.

Madder family (Rubiaceae)

712. *Anthocephalus chinensis* (Lam.) A. Rich. ex Walp* (*A. cadamba* (Roxb.) Miq.), kadam. L, I. A rapidly growing timber tree, tested experimentally in forestry plots.

714. *Antirhea coriacea* (Vahl) Urban (*Stenostomum coriaceum* (Vahl) Griseb.), quina. M, U, Mc, T, (4). Scattered in moist areas at 200-2,500 feet altitude.

239. *Antirhea obtusifolia* Urban (*Stenostomum obtusifolium* (Urban) Britton & Wilson), quina. Sh-M, U, T, E, (9). Endemic to mountain forests, mainly in understory, in Luquillo and Carite Mountains of eastern Puerto Rico.

720. *Chione venosa* (Sw.) Urban, Martin Avila. Sm-M, R, T, (2). To 1,500 feet altitude.

240. *Coffea arabica* L.,* café, coffee. Sh, I. Coffee plantations are located in mountains.

724. *Exostema sanctae-luciae* (Kentish) Britten. Sh-Sm, R, C, (4). Sterile specimens were collected by Alain Liogier in Luquillo Mountains in 1963.

242. *Faramea occidentalis* (L.) A. Rich., cafeílo, false-coffee. Sh-Sm, U, T, (1). In understory.

243. *Genipa americana* L., jagua, genipa. M, U, T, (1).

730. *Guettarda valenzuelana* A. Rich. (*G. laevis* Urban), cucubano de monte. Sm-M, Cm, T, (5). In Puerto Rico common locally and known only from Luquillo Mountains at 1,500-2,000 feet altitude.

245. *Ixora ferrea* (Jacq.) Benth., cafeílo. Sh-Sm, Cm, T, (2). In understory.

736. *Palicourea crocea* (Sw.) Roem. & Schult. (*P. brevithyrsa* Britton & Standl.), cachimbo, red palicourea. Sh, Cm, Mc, T, C, (2). Common in understory of moist forests from sea level to 3,300 feet altitude.

738. *Palicourea riparia* Benth., cachimbo, yellow palicourea. Sh, A, Mc, T, C, (1). Abundant in understory of moist forests from sea level to 2,500 feet altitude.

741. *Psychotria berteriana* DC., cachimbo común. Sh-Sm, A, C, D, (1). Abundant in understory of mountain forests.

742. *Psychotria grandis* Sw., cachimbo grande. Sm-Sh, R, T, C, (1). Rare in understory of lower and upper Luquillo Forests at 300-3,000 feet altitude.

743. *Psychotria maleolens* Urban, cachimbo de gato. Sh, Cm, T, C, E, (8). Common locally as understory shrub, endemic to mountains of Puerto Rico.

248. *Rondeletia portoricensis* Krug & Urban, juan tomás. Sm-M, R, T, C, E, (8).

Honeysuckle family (Caprifoliaceae*)

749. *Sambucus simpsonii* Rehd.,* saúco, Florida elder. Sh, I. Uncommon planted ornamental.

Composite family (Compositae)

250. *Clibadium erosum* (Sw.) DC., carruzo. Sh-Sm, Cm, T, C, D, (6). Opening cutover areas, and roadsides. A light-requiring species mainly of disturbed areas.

750. *Eupatorium portoricense* Urban (*Critonia portoricensis* (Urban) Britton & Wilson), guerrero. Sh-Sm, Cm, T, C, (8). Common in moist mountains to 3,000 feet altitude throughout Puerto Rico. Endemic to Puerto Rico and Vieques.

TREES OF THE CARIBBEAN NATIONAL FOREST, PUERTO RICO

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The Caribbean National Forest in the Luquillo Mountains of northeastern Puerto Rico is unique within the National Forest System. Its tropical vegetation varies from luxuriant rain forests on the lower slopes to dwarf forests on the exposed peaks. Within its boundaries of 28,000 acres are 225 species of native trees, more than in any other equal area of the United States. Among these species, 88 are classed as endemic or rare. Sixty-eight are limited to Puerto Rico and 23 of them found wild only within the forest boundaries.

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